

## **Emergency Preparedness**

**ISSUE 7:** Under what conditions can the emergency planning zone (EPZ) be reduced, including a reduction to the site exclusion area boundary?

### **BACKGROUND:**

Currently operating light-water reactors (LWRs) have a 10-mile plume exposure pathway EPZ and a 50-mile ingestion pathway EPZ as required by 10 CFR 50.47, "Emergency Plans." There have been instances in the past where smaller EPZs were approved (e.g., Ft. St. Vrain had a 5-mile plume exposure pathway EPZ) and the regulation (10 CFR 50.47) includes a provision allowing EPZs for High Temperature Gas-Cooled Reactors (HTGRs) to be determined on a case-by-case basis. In SECY-93-092, "Issues Pertaining to the Advanced Reactor (PRISM, MHGTR, and PIUS) and CANDU Designs and Their Relationship to Current Regulatory Requirements," dated April 8, 1993, the staff, at that time, proposed no changes to the existing regulations governing emergency preparedness (EP) for advanced reactor licensees. The staff proposed to provide regulatory direction at or before the start of the design certification phase so that any EP implications on design could be addressed. The staff viewed the inclusion of emergency preparedness by advanced reactor licensees as an essential element in NRC's "defense-in-depth" philosophy so that, even in the unlikely event of an offsite fission product release, there is reasonable assurance that emergency protective actions can be taken to protect the population around nuclear power plants.

The Commission, in its staff requirements memorandum (SRM) of July 30, 1993, stated that it was premature to reach a conclusion on emergency planning for advanced reactors and that for ongoing review purposes, the staff should use existing regulatory requirements. The SRM went on to say that the staff should remain open to suggestions to simplify the emergency planning requirements for reactors that are designed with greater safety margins, and that the work on EP should be closely correlated with work on accident evaluation and source term, in order to avoid unnecessary conservatism.

### **DISCUSSION:**

Emergency preparedness is considered by many to be the last line of defense in the defense-in-depth philosophy. Its requirements have been established in consideration of the potential for accidents that could lead to severe core damage and the subsequent release of large amounts of radioactive material. For LWRs this release could occur in a matter of hours after the initiating event and a 10-mile plume exposure pathway EPZ has been chosen to envelope the distance beyond which it is very unlikely doses large enough to cause early fatalities would occur. In considering whether or not to modify the EPZ, similar considerations would need to be taken into account. These could include:

- What is the potential for a severe core damage accident?
- What is the potential for a large offsite release of radioactive material?

- Should the assumption of a large offsite release be a fundamental part of defense-in-depth?
- How should the characteristics of the release be used to set the EPZ (e.g., potential for early fatalities, timing of release)?
- How should uncertainties and experience with the design and technology be taken into account?

At the public workshop, held October 22–23, 2002, most participants felt that in the near term there was no urgency to change EP requirements for future plants. The reasons cited were that for HTGRs, 10 CFR 50.47 already contains a provision allowing the EPZs for HTGRs to be determined on a case-by-case basis and, in the near term, it is likely that new plants will be proposed using existing sites, which already have EP provisions in accordance with 10 CFR 50.47

#### OPTIONS:

The options considered by the staff in addressing this issue are:

- (a) No change from current requirements.

This option reflects the position of the Commission in its July 30, 1993, SRM. It recognizes the lack of experience with non-LWRs and, given the possible changes in the area of event selection, source term and containment discussed in Issues 4, 5, and 6, represents a step-by-step approach wherein changes to the final line of defense (EP) will not be made until there is experience with the new designs. In addition, 10 CFR 50.47 already contains a provision for HTGRs (the most likely non-LWRs in the near future) which allows a case-by-case determination for their EPZs. Thus, it can be argued that for HTGRs, no changes to current requirements are needed. Finally, in the near term it is likely that any new plants would be built on an existing site with an emergency plan, thus removing any urgency for changes in this area.

- (b) Allow a reduction in the EPZ based upon the extent and timing of predicted core damage and fission product release.

This option could be considered a follow-on to the position stated in the Commission's July 30, 1993, SRM directing the staff to remain open to suggestions to simplify the emergency planning requirements for reactors that are designed with greater safety margins. Under this option criteria would be developed that, if met, would allow reductions in the EPZ. Such criteria could be developed as part of development of a framework for future plant licensing. Such criteria could also provide guidance to implement the case-by-case provision for HTGRs in 10 CFR 50.47.

This option would be consistent with a risk-informed regulatory approach and with the risk-informed approaches recommended for event selection, source term and containment and could provide incentive for reactor designers to stress accident and core damage prevention. This option could lead to a reduction in the EPZ and, in the extreme, to the site exclusion area boundary.

### RECOMMENDATION:

The staff recommends the Commission not modify EP requirements at this time. This recommendation is consistent with Option a above and is based upon the following two considerations::

- Provision already exists in 10 CFR 50.47 for accommodating the unique aspects of high-temperature gas reactors.
- In the near term, new plants are likely to be built on an existing site which conforms to current requirements.

If approved by the Commission, the role of emergency preparedness in defense-in-depth would be addressed as part of the development of a policy or description of defense-in-depth as recommended under Issue 2 above. In the longer term, if and when a need for change in emergency preparedness requirements is identified, that policy or description would serve as guidance in assessing the proposed change.